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ECCHYMOSES FROM NATURAL CAUSES

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BY

H. A. LEDIARD, M.D.,
SURGEON TO THE CUMBERLAND INFIRMARY

[*From Volume 79 of the 'Medico-Chirurgical Transactions'*]

LONDON
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ECCHYMOSES FROM NATURAL CAUSES

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Extravasations of blood within or upon the surface of the body, due to causes arising within the body, have been recognised for a long while, and if in this paper I am treading upon well-trodden ground, my reason will be found in the plea I raise for a more extended recognition of all those causes leading to ecchymoses in various parts of the tissues and organs of the body.

The subject as treated here has but one interest, viz. the part these spontaneous hæmorrhages might play in a medico-legal drama.

Death by asphyxia is caused by four well-known means, viz. suffocation, hanging, strangulation, and drowning, and if the post-mortem appearances are not constant it is due to the great variety of ways in which these four modes of death are effected.

In suffocation, for instance, there are mechanical and dynamical causes. In drowning, five eighths of the cases, according to Ferrier, are mixed, *i. e.* asphyxia is associated with other causes.

In hanging and strangulation the interference with respiration may be sudden or gradual, or the "long drop" may cause fracture of the vertebræ and crushing of the spinal cord.

These varieties in the production of the same mode of death create an inconstant variety of appearances, and tend to bring about some confusion, especially when, as to suffocation, there may be no external circumstance, such as a rope or a mark on the neck, indicating the possible mode of death.

It can hardly be a matter for surprise if these inconstant appearances in death from asphyxia do occasionally lead to judicial error.

Of the four modes of asphyxial death, suffocation is the one in which ecchymosis is the most widely distributed; and in a paper contributed by Francis Ogston ('Brit. Med. Journ.,' Sept. 26th, 1868), "On punctiform ecchymoses in the interior of the body as a proof of death by suffocation," these appearances were found on the lungs, heart, thymus, pericardium, aorta, pulmonary artery, diaphragm, pericranium, scalp, pleura costalis, liver, spleen, and kidneys. No mention, however, is made of mucous membrane.

Dr. Ogston's inquiry was not made to prove the extent and distribution of capillary ecchymoses, but to show that these ecchymoses gave strong presumptive evidence of death by suffocation.

Now the leading factors in the production of effusions of blood within and upon the surface of the body in death from asphyxia are:

1. Embarrassment or abolition of respiration.
2. Abundance of blood in the capillary system.
3. General increase of blood-pressure, greatly increased by continuous efforts to expire.
4. Gorging of the right side of the heart.

In the first instance there is general hyperæmia of the internal organs, and secondly a tendency to extravasation.

Probably no vascular organ or tissue of the body is free from this liability to ecchymosis in asphyxial modes of death. According to Briand and Chaudé (vol, i, p. 586, 10th edit.), "the diversity of the causes of asphyxia necessarily determine the essential differences in the morbid phenomena after death, differences which are particularly subordinate to the more or less rapid action of the determining causes."

"If asphyxia is slow it commences by a state of agony and oppression, soon followed by swooning; the face, the lips, the orifices of all mucous membranes take a more red tint, sometimes even purple (violacée), and this coloration appears also sometimes over diverse portions of the cutaneous system." This passage is quoted because the authors (Briand and Chaudé) refer to the mucous membranes.

The length of time during which the struggle in asphyxia may be going on varies according to the means by which it is produced, and in this respect there would be a considerable difference between the instantaneous death in judicial hanging and suffocation caused by a foreign body lodging in the œsophagus or windpipe.

As a rule, two to five minutes is the duration of the struggle in asphyxia.

The extraordinary muscles of respiration are first called into action, the venous blood stimulating the nerves of the respiratory centre and evoking violent attempts at respiration. Secondly, inspiratory muscles are less active, and the expiratory muscles contract energetically. Lastly, the respiratory centres are paralysed (Dixon Mann).

The heart continues to beat for, it may be, ten minutes longer. Sensibility is soon lost, and the efforts to breathe are continued during insensibility and final convulsions.

Dr. Michael Foster sets forth how, in experiments on animals, "it is very soon observed that the expiratory efforts are exaggerated out of all proportion to the inspiratory, and how quickly they pass into convulsion. During this period (which is found to occupy a little more than a minute) the blood-pressure in the arteries rises very greatly, and the cardiac pulsations are increased in frequency." (Hilton Fagge, vol. i, p. 10.)

The morbid appearances after death from asphyxia are engorgement to a greater or less extent of the right cavities of the heart, and of all the more important viscera such as the lungs, liver, spleen, kidneys, and brain, with comparative vacuity of the left side of the heart and arterial vessels (Ogston, Lect. Med. Jurisp.).

Over-pressure in every part of the venous system is the chief factor in the production of hæmorrhagic spots noted by all authorities in asphyxial modes of death.

At first attention seems to have been fixed upon subpleural ecchymoses, with which Tardieu's name has been associated, and although they are no longer considered proof of death by suffocation, yet they are of value as a proof of death by one or other of the modes in which asphyxia destroys life. They are found on the surface of the lung when the general blood-pressure is greatly increased by continuous efforts to expire, and they are found whenever a similar relation between the respiratory movements and the blood-pressure exists. Their distribution is wider than Ogston recorded, for in hanging the mucous membrane of the stomach is not unfrequently intensely injected, a condition shared by the mucous membrane of the intestines (Dixon Mann, p. 193), and ecchymoses are occasionally found in both. Under their general remarks upon death by asphyxia, Woodman and Tidy note extravasations of blood, some minute and stellate, others of irregular form, and many of bright colour, on the mucous and serous membranes, pleuræ, pericardium, peritoneum, membranes of the brain, lining membranes of the ventricles, the conjunctivæ and the mucous membranes of the digestive and genito-urinary tract (p. 919).

In death by hanging, Ferrier remarks that vascular turgescence of the genitals in females, with sanguinolent effusion, are frequently observed. The same author notes intense congestion of the mucous membrane of the stomach.

There is variation in the post-mortem appearances in hanging and drowning, but in suffocation the fatal event is dependent upon asphyxia alone, and the signs are more marked.

Suffocation is easy as a means for infanticide, but difficult to carry out in adult males unless stupefied. Burke is stated to have intoxicated his victims prior to suffocating them. Foreign bodies in the air passages of individuals of advanced years may cause death with rapidity, and in such the ecchymoses in the body would be but little marked.

Of all the modes of asphyxial death, suffocation is probably the one in which there would be the most prolonged death agony, whereas in hanging the compression of the blood-vessels in the neck would produce early unconsciousness. An obstruction in the air-passages or gullet whilst causing violent efforts to breathe would in no way prevent the circulation of blood in the body, but would tend to increase pressure in the venous system, and as a consequence favour the production of ecchymosis. Casper, like other authors, gives examples of capillary hæmorrhage beneath the pulmonary pleura, upon the aorta, on the surface of the heart, upon the diaphragm and tracheal mucous membrane in deaths from suffocation. In a case (No. 270, p. 187, vol. ii) of suicidal hanging, he noted "the heart completely sprinkled over with petechial ecchymoses, particularly at its base. The internal surface of the pericardium was also covered with many similar ecchymoses."

Circumstances may intervene to prevent the usual post-mortem appearances, for instance syncope in cases of hanging and drowning, and exhaustion following efforts at swimming.

When large crowds of people are gathered together, suffocations occasionally take place in public, chiefly by asphyxia, though in some cases injuries contribute to the death. In Paris in 1837 eleven men and twelve women died standing or while being borne along in a crowd. A similar calamity occurred in the same city in 1866, when about forty persons perished, the immediate cause of death being traced to suffocation due to pressure. At Sunderland in 1883 nearly two hundred children lost their lives, for the most part by compression of the chest. The details of this disaster were noted by Dr. Lambert in the 'British Medical Journal' for 23rd June, 1883. He thought that "a hundred children died in the first five minutes after the rush occurred. In most of the cases that had advanced beyond the initial stage of suffocation we noticed convulsive movements of the eyes and limbs and almost insensibility, but it was astonishing, even in those cases where we were assured that there was only a spark of life left in them, how soon they would recover, and after a drink of water would walk away with a little assistance."

"The dead," says Dr. Lambert, "nearly all presented the same characteristic appearance, viz. a congested, puffy face, purple or blackish turgescence of the vessels of the neck, closed eyelids, protruding and fixed eyeballs, pupils dilated to the utmost, bloody froth issuing from the nose and mouth, giving the appearance of an intense degree of suffering and anxiety, yet in twenty-four hours after death much of this passed off, and the face reposed into a slight smile, as seen in sleep."

Whether the children were crushed or suffocated, or trampled down, probably makes little difference in the post-mortem appearances, as in any case respiration was more or less rapidly stopped.

From Dr. Lambert I learn that submucous hæmorrhage was present to a very large extent in every child who was crushed to death. In female children, vaginal and rectal extravasation was quite common.

In addition to asphyxial modes of death, there are certain other conditions which in the living may be associated with ecchymosis. Thus Taylor (vol. i, p. 514, 1894, 4th ed.) remarks, "Ecchymosis may sometimes proceed from causes irrespective of the direct application of violence to the skin. Strong muscular exertions, the act of vomiting, and many other conditions, may give rise to a rupture of the minute vessels and to an effusion of blood in parts which have been stretched or compressed."

This important paragraph would have been more useful had examples been furnished of the various causes of ecchymosis; as it is, however, Taylor is the only authority who seems to recognise that difficulty might arise from mal-interpretation of spontaneous ecchymoses.

In epilepsy are seen muscular exertions of great strength, and cutaneous as well as submucous extravasations are met with. It is, again, with reference to subpleural extravasations that the ecchymoses of epilepsy have been studied, and rare as deaths actually are after a succession of epileptic fits, yet subpleural ecchymosis has been found (Briand and Chaudé, vol. i, p. 602).

In the 'Lancet' (October 8th, 1892, p. 862) a case of extensive subcutaneous extravasation of blood during an epileptic fit was noted as having been reported by Dr. Cabadé at a Congress held at Pau.

The man was a carpenter aged forty, and so severe were the extravasations that it was fully two months before the signs of ecchymosis disappeared. More or less ecchymosis from epilepsy will not transcend the observation of any practitioner, and I have actually seen it occur. A few years ago, when in the Dean Close Ward in the Cumberland Infirmary, a patient was seized with an epileptic fit; I went to the bed and saw a patch of blood appear beneath the conjunctiva of the right eye. Many of the ecchymoses of epilepsy are purely traumatic. I am not, of course, alluding to such, but in my case of subconjunctival ecchymosis the man was on his back in bed, and in Dr. Cabadé's case the man was also in bed at the side of his wife, and had no fall or any similar cause for ecchymosis.

The next example of strong muscular exertions in which it is not unusual to meet with ecchymosis of the features is difficult and prolonged labour in a strong and muscular woman.

This cause was probably kept in view by Taylor in the passage quoted, for subconjunctival and circumorbital punctiform ecchymosis is frequently met with in prolonged labour. Tarnier and Chantreuil (tome i, p. 784) remark on the presence of subconjunctival ecchymosis in labour.

Another cause of rupture of minute vessels is the act of vomiting (Taylor), and the mucus vomited is so often tinged with blood that it is quite certain that extravasation of blood may take place into the mucous membrane of the stomach. Subconjunctival hæmorrhage is also met with during strong efforts of vomiting. The straining and compression of the stomach would tend to promote ecchymosis, whilst the downward pressure of the diaphragm, often sufficient to overcome the resistance of the sphincters, might produce ecchymosis or hæmorrhage of the mucous coat of the orifices of the vagina and rectum.

In whooping cough it is not unusual to meet with ecchymoses, and the occurrence is familiar to all general practitioners of medicine.

These ecchymoses are due to the vascular turgescence of the tissues of the face from interrupted circulation during the spasm of the respiratory muscles, with perhaps further strain from vomiting.

Hilton Fagge (vol. i, p. 1020) remarks that one or both of the conjunctivæ may become ecchymosed.

Dr. Dolan (art. "Pertussis," 'Keating's Cyclopædia of the Diseases of Children,' vol. i, p. 715) remarks, "In many cases there is bleeding from the nose, ears, mouth, and rectum."

Goodhart ('Diseases of Children,' 1885, p. 206), "In many cases there are extravasations of blood beneath the conjunctiva."

Probably all writers mention this accompaniment of the disease, which is mentioned here because it further illustrates the natural production of ecchymoses from causes existing within the body.

There are several other conditions causing superficial and deep extravasations of blood, due to morbid states of the blood, such as scurvy, purpura, and scurvy rickets.

The blood extravasations of scurvy rickets between the bone and periosteum may amount to a complete bone sheath, and could hardly be attributed to external violence. In scurvy, ecchymoses are seen in various parts of the body, but especially in the lower limbs (Barlow, 'Keating,' vol. ii, p. 265).

According to Hamilton and Godkin (vol. i, p. 244, 1895), "the appearance after death of purpuric spots is very similar to that of a bruise produced at the time of death, but their size and general connection, combined with the fact that similar spots are to be found in the mucous membrane of the throat and alimentary canal, will prevent the examiner from confounding them with ecchymoses resulting from violence."

Sir Dyce Duckworth states that hæmorrhage may occur into the joints in gout, and quotes a case of Dr. Pye-Smith's where it was met with in the knees, hips, great toes, ankles, wrists, and one elbow.

Extravasations of blood into the retina in gout have been observed by Mr. Hutchinson.

In hæmophylic subjects considerable extravasations are seen from mucous surfaces.

In pernicious anæmia, gastric and retinal hæmorrhages occur, and punctiform ecchymoses have been found on the endocardium.

Capillary ecchymosis is met with in the heart and lungs after purpura, eruptive and low fevers, and cholera.

A bruised appearance succeeds erythema nodosum.

According to Carter and Frost ('Ophthalmic Surgery,' p. 529), "ecchymosis of the eyelids never occurs spontaneously except in abnormal states of the blood, as in scurvy, but ecchymosis beneath the conjunctiva frequently occurs without obvious cause. Sometimes it is produced by straining, as in coughing, or during parturition; occasionally it occurs during the night, and has then sometimes led to a suspicion which subsequent history has confirmed, of the patient having had an epileptic fit."

Lastly, reference is made by Briand and Chaudé to the existence of subpleural ecchymosis in individuals dying of convulsions—epileptic, eclamptic, or tetanic.

There is reason to believe that in semi-asphyxial conditions and in asphyxial modes of death, the mucous surface of the respiratory passages and of the gastro-intestinal tract have received attention from those performing examinations for medico-legal purposes. The same may be said for the serous coverings of the lungs and heart as well as that of the abdominal viscera, but there is not much evidence to show that the mucous surface of the vagina has been subjected to any systematic observation. It is not possible to believe that the mucous membrane of the vagina and vulva could either by its structure or position be exempted from a liability to punctiform ecchymoses large or small, which have been noted as occurring in almost every other part of the body.

The argument would rather be that both the position and the structure of the vaginal mucous membrane would lead to spontaneous hæmorrhage in a remarkable manner.

It may probably be asserted that if there is but little record of submucous extravasations of blood in the vulva or vagina, it is not because they have not existed, but because they have not been observed or more probably because they have not been looked for.

No doubt what is chiefly required in all post-mortem examinations for medico-legal purposes is the establishment of the mode of death, and the inquiry terminates when sufficient evidence is found for the purpose held in view. Under "post-mortem appearances in death by strangulation," Woodman and Tidy (p. 949) say : "Do not forget to examine the genital organs and their vicinity, particularly in females." This passage, I take it, is rather a hint to the observer to look out for evidence of assault, and if so, bloodstains would, to the inexperienced, at once suggest rape. That the mucous membrane of the vagina has been observed from time to time in asphyxial modes of death is quite clear, but it has probably never occurred to any authority that the punctiform ecchymoses, if they exist, could possibly suggest rape ; Ferrier, for instance, alludes to vascular turgescence and sanguinolent effusion in both sexes in hanging. Woodman and Tidy speak of extravasations of blood in the membranes of the genito-urinary tract in asphyxia, but the most remarkable confirmation of views here put forth comes from Sunderland, where, on the bodies of the female children, vaginal and rectal extravasations were quite common (Lambert).

If there is but little special material to make use of to support opinions put forward here, it must be because deaths from asphyxia are not commonly met with (if drowning is excepted), and only a small proportion of those so dying would be females, whilst a still smaller proportion would be found in such circumstances surrounding the body as might suggest rape. It is, however, just in such an exceptional case that the effusion of blood on the vulva, due to the asphyxial mode of death, might lead to error. It must be recognised that hæmorrhage upon or into the mucous membrane of the vagina may be due to natural causes, and rather than to search for proof of rape it would be the duty of the medical man to search for further evidence of death by asphyxia, and to consider whether an asphyxial mode of death was not sufficient to account for the marks of blood on the genital organs.

The circumstances of the death of a woman from obstruction in the windpipe, associated with a supposition of rape, is of infrequent occurrence, but it would unquestionably place a suspected person in a very alarming and difficult position if such charge depended entirely upon post-mortem appearances. Hence the importance of keeping in mind the possibility of the mucous membrane of the vagina sharing in the general extravasations of blood found throughout the body in asphyxial modes of death.

Rather more than two years ago an effort made to obtain the opinions of those teaching medical jurisprudence in this country resulted in some four replies out of more than a score of letters; and it would appear, though I do not say that it was so, that the attention of lecturers had not been drawn to the mucous membrane of the vagina by any special circumstance.

Dr. Dixon Mann, of Manchester, said, "There can be no doubt as to the occurrence of submucous hæmorrhages in asphyxial modes of death, and they might in certain positions be wrongfully interpreted as being due to local violence."

This opinion tolerably well sums up all that is contended for here, but such a general statement is quite insufficient for the practical working of everyday occurrences. Moreover, no such statement is to be found, so far as I know, in any English text-book upon medical jurisprudence.

It is a matter for regret that insufficient prominence has been given in works on medical jurisprudence to the occurrence of ecchymoses from natural causes, inasmuch as a tabulation of all the natural causes which may produce such appearances would be of much service to the practical medical jurist, or to those who may be called upon to perform post-mortem examinations for medico-legal purposes. In my opinion the time has arrived for the inclusion of a special article upon this subject in all new editions, for I am not sure that the importance of ecchymoses from natural causes has been fully recognised by those engaged in teaching medical jurisprudence, even if lecturers have been all along well aware of the great variety of circumstances which may lead to appearances suggestive of external violence.